

# User Manual

**BK06**

**Bus node for INTERBUS**

Part number: 80 860.540

Version: 1

Revision: B

Date: 27 April 2004

Revision	Date	Modifications
0	31 May 2002	First edition
A	31 May 2002	User manual layout changed
B	27 April 2004	Cable length of INTERBUS optical fiber, chapter "identification" added

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# 1 Important Notes

## 1.1 Symbols

The symbols in this manual are used to draw your attention on notes and dangers.

### 1.1.1 General Symbols



#### **Danger**

This symbol is used to refer to instructions which, if ignored or not carefully followed could result in personal injury.



#### **Notes**

This symbol indicates application tips or supplementary notes.



#### **Reference to source of information**

This symbol refers to detailed sources of information on the current topic.

### 1.1.2 Specific Symbols

The following symbols indicate specific dangers which could result in damage to equipment or personal injury or even up to the death of the operator.



#### **Danger - Electric Shock**



#### **Danger - Corrosive**



#### **Danger - Toxic**



#### **Danger - Explosive**



#### **Danger - Fire**



#### **Danger - Infrared Light**



#### **Danger - Electrostatic Charge**

## 1.2 Safety Notes

- Read this manual carefully before using the operating device. Keep this manual in a place where it is always accessible to all users.
- Proper transportation, handling and storage, placement and installation of this product are prerequisites for its subsequent flawless and safe operation.
- This user manual contains the most important information for the safe operation of the device.
- The user manual, in particular the safety notes, must be observed by all personnel working with the device.
- Observe the accident prevention rules and regulations that apply to the operating site.
- Installation and operation must only be carried out by qualified and trained personnel.

### 1.2.1 Intended Use

- The device is designed for use in the industry.
- The device is state-of-the art and has been built to the latest standard safety requirements. However, dangerous situations or damage to the machine itself or other property can arise from the use of this device.
- The device fulfills the requirements of the EMC directives and harmonized European standards. Any modifications to the system can influence the EMC behavior.



This is a class A device. This device may cause radio interference in residential areas. In this case, the user may be required to introduce appropriate countermeasures, and to bear the cost of same.

## 1.3 Target Group

All configuration, programming, installation, commissioning, operating and maintenance work in connection with the automation system must be performed by trained personnel only (e.g. qualified electricians, electrical engineers, etc.).

The configuration and programming personnel must be familiar with the safety concepts of automation technology.

The operating personnel must have been trained in handling the controller and be familiar with the operating instructions.

The installation, commissioning and maintenance personnel must have an education which entitles them to work on automation systems.



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## 2 Installation and Commissioning

### 2.1 Unpacking the Device

Unpack all parts carefully and check the contents for any visible damage in transit. Also check whether the shipment matches the specifications on your delivery note.

If you notice damages in transit or discrepancies, please contact our sales department immediately.

### 2.2 Mounting the Device

The device can be easily mounted onto a mounting rail 35 x 7.5 (H x D) within a minimum of time.

Two spring clips are provided on the back of the BK06. You can use these spring clips to fasten the BK06 onto the mounting rail.

2.2.1 Front Dimensions

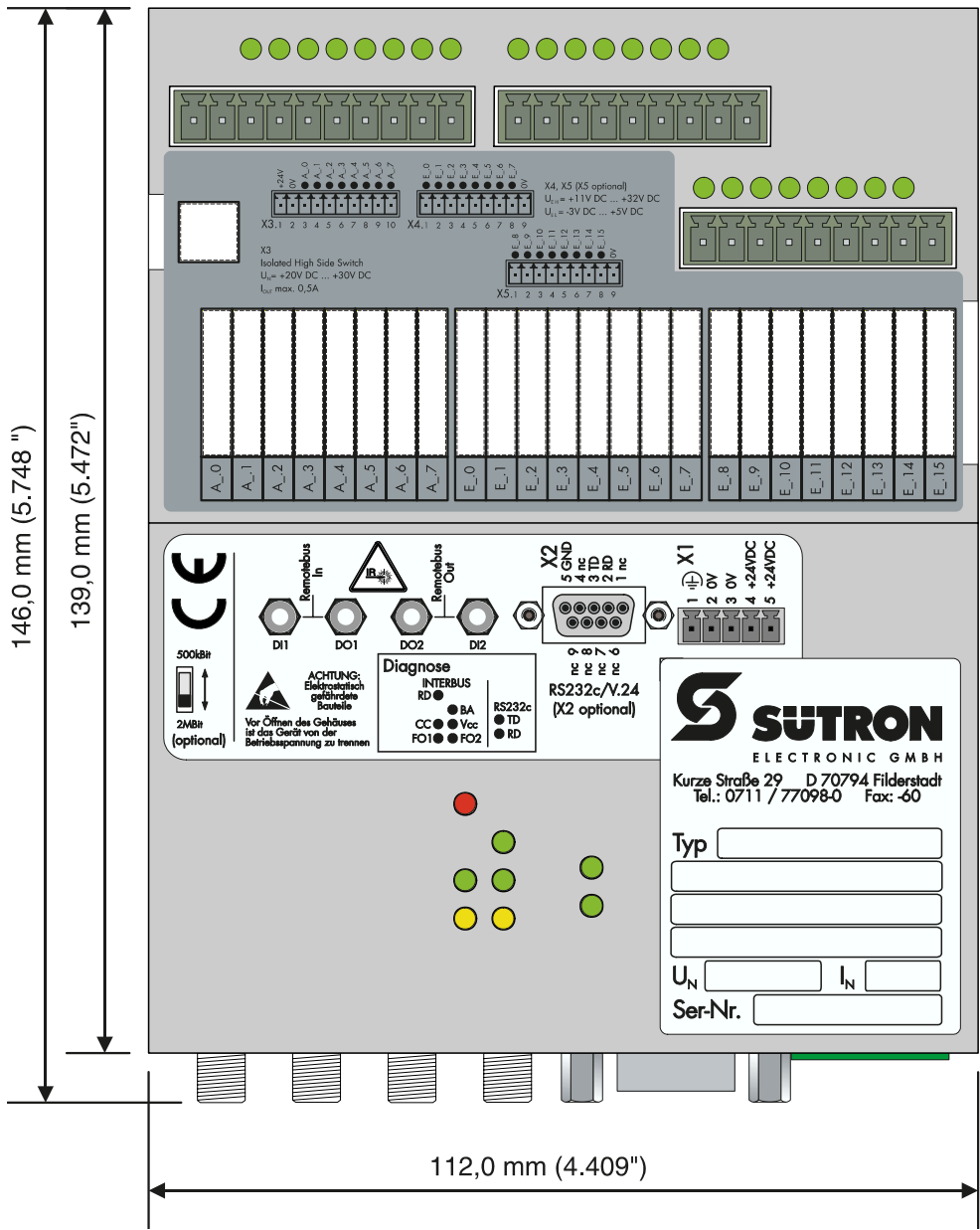


Figure 2-1 BK06 dimensions

## 2.2.2 Side View, Mounting Depth

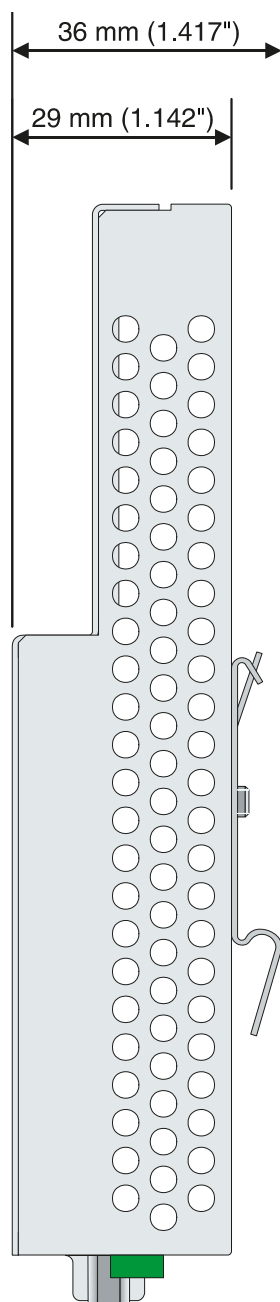


Figure 2-2 Side view, mounting depth

## 2.3 Connecting the Device

### 2.3.1 Supply Voltage

The supply voltage is supplied via connector X1.



Pins 2 and 3 as well as pins 4 and 5 are jumpered internally to allow looping through of the supply voltage.



The maximum continuous power allowed to flow from pin 2 to 3 and from pin 4 to 5 is 5 A. To avoid an overload, an external protection must be installed (e.g. fusible cut-out).

The device has reverse polarity protection. In case of wrong polarity, the device will not operate.

This is a protection class III device. For safe operation, safety extra-low voltage (SELV) in accordance with DIN EN 61131 must be used for the supply voltage.

Connector in the terminal: 5 pin connector, Phoenix COMBICON MC 1.5/5-G-3.81

Table 2-1 Pin assignment X1 supply voltage

Pin	Designation	Function
1		Low-Noise Ground
2	0 V	Supply Voltage 0 V
3	0 V	Supply Voltage 0 V
4	24 VDC	Supply Voltage 24 VDC
5	24 VDC	Supply Voltage 24 VDC

A suitable female connector strip of the type: Phoenix COMBICON FK-MCP 1.5/5-ST-3.81 is supplied.



Cables with finely stranded conductors with a cross-section of up to 2.5 mm<sup>2</sup> (0.098") can be used.



Hazardous voltages can exist inside electrical installations that can pose a danger to humans. Coming in contact with live parts **may result in electric shock!**

Use the following procedure to connect the device to the supply voltage:

1. Strip approx. 30 mm (1.181") off the outer cable sheath and approx. 5 mm (0.197") off the wires.

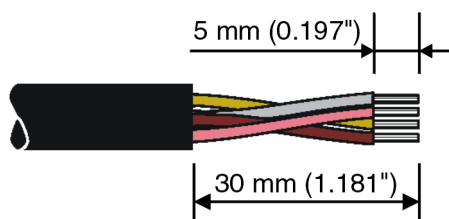
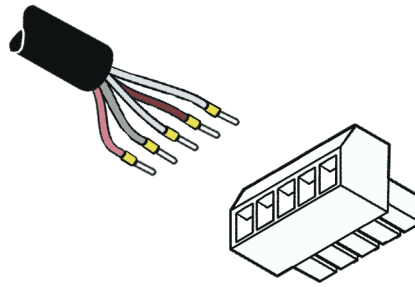


Figure 2-3 Preparing the cable

39A

2. Fit the wires with wire end ferrules and connect the wires to the connector.



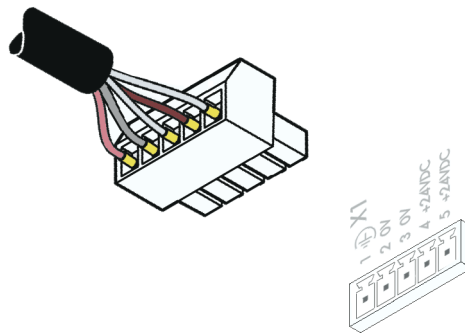
3310

Figure 2-4 Connecting the female connector strip



If shielded connecting cables are used in the supply voltage area, the shield should be connected to pin 1.

3. Plug the female connector strip onto connector X1.



3300

Figure 2-5 Female connector strip is plugged on

## 2.4 Switching the Device on

After applying the supply voltage properly, the diagnostics LED for voltage monitoring (Vcc) must be active.

## 2.5 Identification

You identify the operating device with the nameplate on the rear.

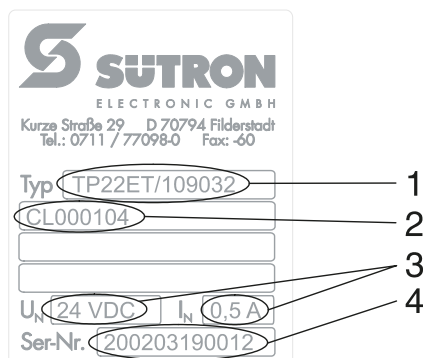


Figure 2-6 Nameplate

1. Order Number
2. Firmware version (Version on delivery)
3. Voltage and Current
4. Serial number

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# 3 Control and Display Elements

## 3.1 Baud Rate Switch

The device can optionally be supplied with the baud rate switch installed on the side of the device (see page 4-4).



The switch position for 500 kBit or 2 MBit is shown on the BK06 label.

## 3.2 Diagnostics LEDs

### 3.2.1 INTERBUS

Diagnostics LEDs are located on the front of the unit. These LEDs show the states of the bus system.

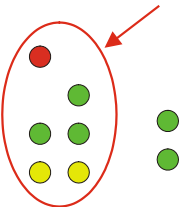


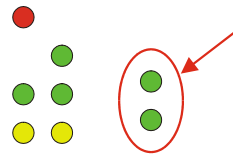
Figure 3-1 Position of the INTERBUS optical fiber diagnostics LEDs

Table 3-1 Functions of the INTERBUS diagnostics LEDs

Designation	Color	State	Function
Vcc	Green	On	Supply Voltage OK
		Off	No Supply Voltage
CC/RC	Green	On	Remote Bus Cable Check
BA	Green	On	Bus Active
		Off	Bus Not Active
RD	Red	On	Remote Bus Inactive
FO1	Yel-low	On	Incoming Optical Fiber Path Not OK
		Off	Incoming Optical Fiber Path OK
FO2	Yel-low	On	Outgoing Optical Fiber Path Not OK
		Off	Outgoing Optical Fiber Path OK

### 3.2.2 RS232c

Diagnostics LEDs are located on the front of the unit. These LEDs show the states of the interface X2 RS232.



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Position of the RS232 diagnostics LEDs

Table 3-2 Functions of the INTERBUS diagnostics LEDs

Designation	Color	State	Function
TD	Green	On	Transmitted Data
RD	Green	On	Received Data

### 3.3 Slide-in Strips

You can make the slide-in strips for identifying the device and the inputs and outputs out of paper (80 g/m<sup>2</sup>). A suitable template is provided on the TSwin CD as a

- Microsoft® Word® file
- Windows meta file®.

The strips are inserted from the side into the corresponding slots.



To prevent the slide-in strips from jamming when they are inserted, we recommend you round off the corners or deburr the edges with a 45° cut.

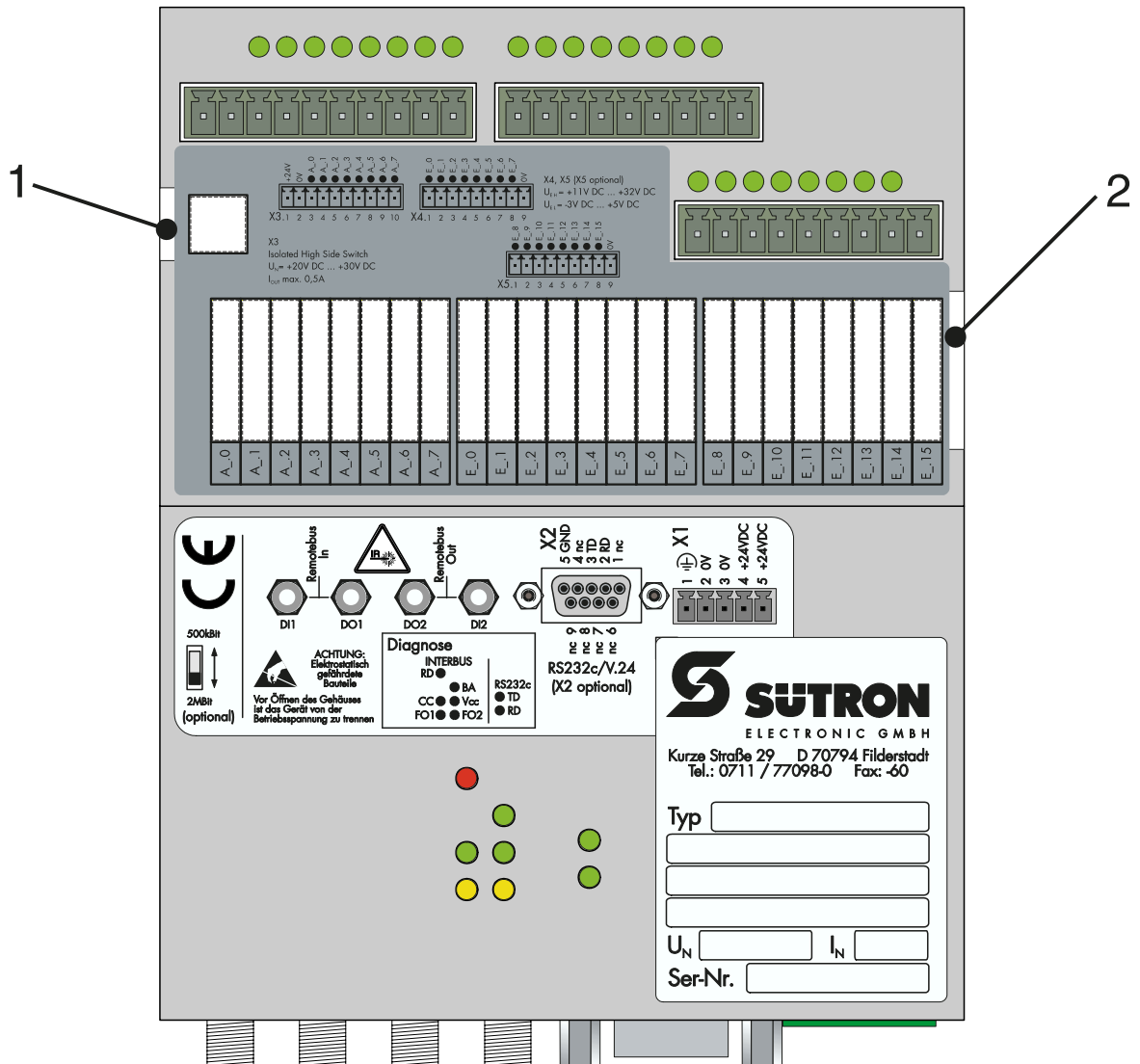


Figure 3-2 Slide-in strips in the BK06

- 1 Slide-in strip for device designation
- 2 Slide-in strip for input and output designation



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## 4 Interfaces of the Unit

The BK06 bus node is a communication block for the INTERBUS. Fiber optical cables are used for the connection to the INTERBUS.

The following bus node types are currently available:

Table 4-1 Device variants

Order Number	Available Elements						ID Code (PC WORX)
	Inputs	LEDs for Inputs	Outputs	LEDs for Outputs	Baud Rate Switch	RS232 Interface	
81151.010	8	X	8	X	X	X	47
81151.110	16	X	8	X	X	X	47
81151.200	16	X	8	X	X	-	3
81151.300	0	-	0	-	X	X	47
81151.510	8	X	8	X	X	X	241
81151.610	16	X	8	X	X	X	241

The X2 RS232c interface can be used for exchanging data (e.g. with a touch panel).

Optionally, either 8 digital outputs can be provided at connectors X3, and either 8 or 16 digital inputs at connectors X4 and X5. Depending on the type, LEDs are available to signal the input/output states.

If configuration is to be carried out with PC WORX, select the ID codes from the table „Device variants“.

## 4.1 Front View

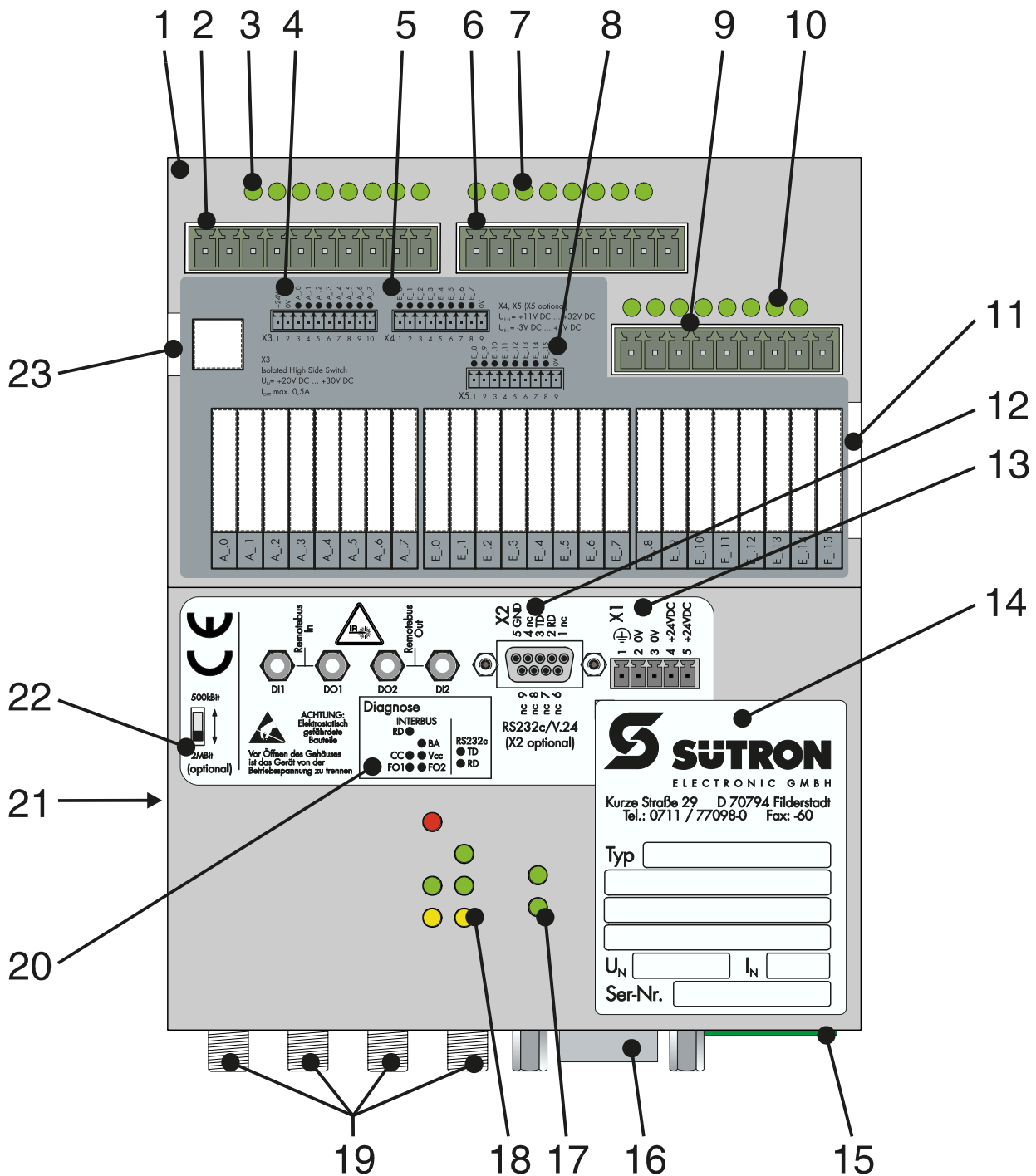


Figure 4-1 Front view of the BK06

- 1 Enclosure
- 2 Connector X3 (Digital Outputs A\_.0 - A\_.7)
- 3 Status LEDs (X3 - Digital Outputs)
- 4 Assignment Connector X3 (Digital Outputs)
- 5 Assignment Connector X4 (Digital Inputs)
- 6 Connector X4 (Digital Inputs E\_.0 - E\_.7)
- 7 Status LEDs (X4 - Digital Inputs)

- 8** Assignment Connector X5 (Digital Inputs)
- 9** Connector X5 (Digital Inputs E\_.8 - E\_.15)
- 10** Status LEDs (X5 - Digital Inputs)
- 11** Slide-in Strips for Output/Input Designation
- 12** Assignment Female Connector X2 (RS232c)
- 13** Assignment Connector X1 (Supply Voltage)
- 14** Nameplate
- 15** Connector X1 (Supply Voltage)
- 16** Female Connector X2 (RS232c)
- 17** Diagnostics LEDs (RS232c)
- 18** Diagnostics LEDs (INTERBUS)
- 19** Optical Fiber Interface (Remote Bus In / Out)
- 20** Diagnostics LED Assignment (INTERBUS / RS232c)
- 21** Location of Baud Rate Switch on the Device (on the Side of Device)
- 22** Switch Position of Baud Rate Switch
- 23** Slide-in Strips for Device Designation

## 4.2 RS232c (X2)

The X2 RS232c interface is used to establish a point-to-point connection (e.g. with a touch panel).

Table 4-2 Connector assignment X2 RS232

Pin	Designation	Function
1	nc	Not Connected
2	RD	Received Data
3	TD	Transmitted Data
4	nc	Not Connected
5	GND	Ground
6	nc	Not Connected
7	nc	Not Connected
8	nc	Not Connected
9	nc	Not Connected

### 4.3 Digital Outputs (X3)

All outputs are protected against polarity reversal. In the event of wrong polarity, the corresponding outputs will not be operated.

A separate and galvanically isolated cable must be used to feed the supply voltage to the outputs.

The outputs are controlled by the INTERBUS.

Table 4-3 Pin assignment X3 digital outputs

Pin	Designation	Function
1	+24 V	Supply Voltage +24 V
2	0 V	Supply Voltage 0 V
3	A_.0	Output A_.0
4	A_.1	Output A_.1
5	A_.2	Output A_.2
6	A_.3	Output A_.3
7	A_.4	Output A_.4
8	A_.5	Output A_.5
9	A_.6	Output A_.6
10	A_.7	Output A_.7

Use the female connector strip Phoenix COMBICON FK-MCP 1.5/10 ST-3.81 to connect the digital outputs. This plug-in connector is suitable for finely stranded wires with a cross-section of up to 1.5 mm<sup>2</sup> (approx. 0.059").

## 4.4 Digital Inputs (X4/X5)

All inputs are non-floating and galvanically isolated using optocouplers.

Table 4-4 Pin assignment X4 digital inputs

Pin	Designation	Function
1	E_.0	Input E_.0
2	E_.1	Input E_.1
3	E_.2	Input E_.2
4	E_.3	Input E_.3
5	E_.4	Input E_.4
6	E_.5	Input E_.5
7	E_.6	Input E_.6
8	E_.7	Input E_.7
9	0 V	Supply Voltage 0 V

Table 4-5 Pin assignment X5 digital inputs

Pin	Designation	Function
1	E_.8	Input E_.8
2	E_.9	Input E_.9
3	E_.10	Input E_.10
4	E_.11	Input E_.11
5	E_.12	Input E_.12
6	E_.13	Input E_.13
7	E_.14	Input E_.14
8	E_.15	Input E_.15
9	0 V	Supply Voltage 0 V

Use the female connector strips Phoenix COMBICON FK-MCP 1.5/9 ST-3.81 to connect the digital inputs. This plug-in connector is also suitable for finely stranded wires with a cross-section of up to 1.5 mm<sup>2</sup> (0.059").

## 4.5 INTERBUS Optical Fiber

Use the special INTERBUS optical fiber interfaces to integrate the bus node into an INTERBUS optical fiber device bus.



Never look directly into the open end of an optical fiber cable! **Infrared light can cause damage to the retina of the eye.** Fit the open ends of an optical fiber cable and the connections with protective caps. Wear protective goggles.



The sending and receiving unit can be rendered unusable by dirt accumulation. For this reason, place protective caps onto the connections when the units are not used or are transported!

The optical fiber interface is designed as a F-SMA 905.

Table 4-6 Assignment DO1, DI1, DO2, DI2 (INTERBUS optical fiber)

Designation	Function
DO1	Remote Bus In
DI1	Remote Bus In
DO2	Remote Bus Out
DI2	Remote Bus Out

The cables are connected in accordance with the "INTERBUS Fiber Optic Installation Guidelines".

Suitable for optical transmission is a dielectric waveguide with step index refractive index profile - a polymer fiber with a core diameter of 980 µm and a cladding diameter of 1000 µm. The F-SMA connector is specified in IEC 874-2 or in DIN 47258, respectively.

The maximum distance between two remote bus users is 50 m (164.042 ft.).

## 4.6 Shielding D-SUB Connectors

You must shield D-SUB connectors as follows:

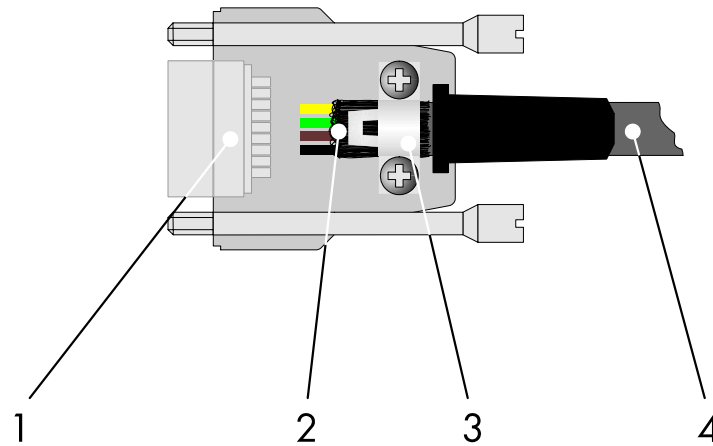


Figure 4-2 Shielding D-SUB connectors

1. D-SUB connector
2. Shield
3. Cable clip
4. Cable

The shield must be folded back into a flat position over the cable sheath.

When fastening the cable with the cable clip, as much of the shielding as possible must be in contact with the housing and sufficient strain relieve must be ensured.

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## 5 Maintenance and Servicing

### 5.1 Fuse



The semiconductor fuse cannot be replaced!

A semiconductor fuse is used to protect the device. Once the fuse has been tripped, the device must be disconnected from the supply voltage to allow the semiconductor fuse to regenerate. At an ambient temperature of 20° C (68° F), the regeneration takes approximately 20 seconds. The higher the ambient temperature, the longer the regeneration takes.



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## 6 Technical Data

Table 6-1 Electrical Data

Electrical Data	
Supply Voltage	24 V DC (SELV in Accordance with DIN EN 61131)
Residual Ripple	10% Maximum
Minimum Voltage	19.2 V
Maximum Voltage	30.2 V
Power Consumption	0.25 A
Connected Load	6 W
Fuse	Semiconductor Fuse
Protection Against Polarity Reversal	Protective Diode

Table 6-2 Standard Interfaces

Standard Interfaces	
Variable Baud Rates and Data Formats	
RS232c	According to DIN 66 259 T1, CCITT V.28 Transmission Length: 0 - 15 m (49.212 ft.), Layer-stranded, Shielded Electrically Isolated

Table 6-3 Digital Outputs

Digital Outputs	
Galvanically Isolated, Protected Against Polarity Reversal, Short-Circuit Proof, Positive Switching, External Supply Voltage Required	
Type	High Side Switch
Output Current	0.5 A (All Outputs Activated at the Same Time) 1.5 A (Every 2nd Output Activated)
Switching Voltage	20 VDC to 30 VDC, Typically 24 VDC
Maximum Low Level	<0.5 VDC
Minimum High Level	>Supply Voltage – 0.5 VDC

Table 6-4 Digital Inputs

Digital Inputs	
Galvanically Isolated, Positive Switching, Supply Voltage Provided to Every Input	
Input Current	10 mA

Table 6-4 Digital Inputs

Digital Inputs	
Input Frequency	100 Hz
Low Level	0 V to 5 V
High Level	11 V to 32 V

Table 6-5 Central Unit

Central Unit	
Central Unit	CPU DS80C320
Clock Frequency	7.5 MHz

Table 6-6 Memory

Memory	
Flash	128 Kbyte
RAM	128 Kbyte, Unbuffered

Table 6-7 Connection System

Connection System	
D-SUB Female Connector Strip, 9 Pin	
Female and Male Connector Strips: Phoenix COMBICON, 5 Pin, 9 Pin, 10 Pin	
Connection FSMA Type 905	

Table 6-8 Environmental Conditions

Environmental Conditions	
Operation	0 °C to 50 °C (32°F to 122°F)
Storage, Transportation	-25 °C to 70 °C (-77 °F to 158°F)
Relative Humidity for:	
Operation and Storage	10% to 95%, No Condensation
Application Area	Degree of Pollution 1



Table 6-9 Standards and Guidelines

Standards and Guidelines	
Interference Immunity	EN 50082-2 EN 61000-4-2 EN 61000-4-3 EN 61000-4-4 EN 61000-4-5 EN 61000-4-6
Emitted Interference	EN 50081-1 EN 55011 Limit Value Class A EN 55022 Limit Value Class A
Equipment Requirements	EN 61131
Storage and Transportation	EN 61131 Part 2
Power Supply	EN 61131 Part 2
Electromagnetic Compatibility	89/336/EEC
Degree of Protection	EN 60529
Impact Load, Shocks	EN 60068 Part 2-27
Sinusoidal Vibrations	EN 60068 Part 2-6
Corrosion Protection	IEC 60068



This is a class A device. This device may cause radio interference in residential areas. In this case, the user may be required to introduce appropriate countermeasures, and to bear the cost of same.

Table 6-10 Enclosure

Enclosure	
Enclosure	Steel Sheet, Galvanized
Mounting Depth	Approx. 36 mm (1.417"), (with Retaining Clip)
Degree of Protection	IP20
Weight	Approx. 410 g



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